

## ASSIGNMENT 5

Textbook Assignment: "Fuel System Overhaul," pages 5-1 through 5-27.

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| <p>5-1. Before rebuilding a carburetor, you should first take which of the following steps?</p> <ol style="list-style-type: none"><li>1. Identify the carburetor</li><li>2. Get the repair specifications</li><li>3. Make sure the carburetor is the problem</li><li>4. Remove the carburetor from the vehicle</li></ol>              | <p>5-6. What organization can authorize an emission control modification?</p> <ol style="list-style-type: none"><li>1. CBC, Port Hueneme, California, Code 15</li><li>2. Gulfport, Mississippi, CED</li><li>3. NAVFAC, Washington D.C.</li></ol>  |
| <p>5-2. Carburetor identification numbers may be found in which of the following locations?</p> <ol style="list-style-type: none"><li>1. In the operations manual</li><li>2. Stamped into the base of the carburetor</li><li>3. On a metal tag screwed or riveted to the carburetor</li><li>4. Both 2 and 3 above</li></ol>           | <p>5-7. To test and adjust a modern carburetor, which of the following tools do you need?</p> <ol style="list-style-type: none"><li>1. An oscilloscope</li><li>2. A Vat 29 or 32</li><li>3. An exhaust gas analyzer</li></ol>   |
| <p>5-3. Before dipping a carburetor into a cleaning solution, you should take which of the following actions?</p> <ol style="list-style-type: none"><li>1. Plug up all vacuum ports</li><li>2. Remove any items that may be affected by the solution</li><li>3. Remove all electronic devices</li><li>4. Both 2 and 3 above</li></ol> | <p>5-8. When an exhaust gas analyzer is used to test vehicle emissions, what will be the result if the probe is not set to the correct depth?</p> <ol style="list-style-type: none"><li>1. A low reading</li><li>2. The analyzer will not respond</li><li>3. A high reading</li><li>4. A normal reading</li></ol>                                 |
| <p>5-4. Which of the following parts are NOT normally removed during a carburetor overhaul?</p> <ol style="list-style-type: none"><li>1. Throttle shaft and float</li><li>2. Throttle shaft and choke shaft</li><li>3. Choke shaft and vacuum pull down</li><li>4. Any plastic parts</li></ol>  | <p>5-9. The fuel injector can atomize fuel more efficiently than a carburetor, resulting in which of the following advantages?</p> <ol style="list-style-type: none"><li>1. Higher volumetric efficiency</li><li>2. No-problem with fuel condensation in the manifold</li><li>3. Improved fuel vaporization</li><li>4. All of the above</li></ol> |
| <p>5-5. When, if ever, may emission controls on CESE be modified?</p> <ol style="list-style-type: none"><li>1. When a person wants to increase fuel economy</li><li>2. When being shipped overseas</li><li>3. During battalion turnover</li><li>4. Never</li></ol>  | <p>5-10. In a gasoline fuel injection system, the fuel pressure regulator diverts the excess fuel to which of the following locations?</p> <ol style="list-style-type: none"><li>1. Back to the fuel tank</li><li>2. Back to the fuel filter</li><li>3. To a tee fitting in the fuel pickup line</li></ol>  |

- 5-11. The computer varies the amount of fuel delivered to the cylinder by which of the following means?
1. Changing the duration of fuel injection
  2. Raising the fuel line pressure
  3. Lowering the fuel line pressure
  4. Both 2 and 3 above
- 5-12. On a gasoline fuel injection system, the entrance of fuel into the combustion chamber is controlled by what means?
1. The throttle valve
  2. Engine vacuum
  3. The intake valve
  4. The ECU
- 5-13. Timed fuel injection systems are used only in which of the following situations?
1. When the cost is less
  2. When more precise fuel metering is required
  3. The timed system maintains a lower fuel line pressure
- 5-14. What activates the cold start injector?
1. Vacuum
  2. Choke lever link
  3. Electric current
- 5-15. What is the most common type of service performed on gasoline fuel injection systems?
1. Preventive
  2. Interim
  3. Injector
- 5-16. Air leaks in the air intake system that bypass ECU sensors can cause which of the following problems?
1. False readings to be sent to the injectors
  2. A rich fuel-air mixture delivery
  3. False readings to be sent to the ECM
- 5-17. A gasoline fuel injection system operates with fuel pressures up to what number of times greater than a standard gasoline fuel system?
1. Two
  2. Four
  3. Five
  4. Ten
- 5-18. On the Caterpillar fuel injection system, the capsule type of injector valve serves what function?
1. It times the delivery of fuel
  2. It meters the fuel
  3. It injects and atomizes the fuel
  4. It pressurizes the system
- 5-19. To check engine performance for faulty fuel injection, you should operate the engine at a speed that accentuates the fault. The next step is for you to try to get the cylinders to misfire by what means?
1. Preventing the spark from reaching each cylinder
  2. Loosening the fuel line nut on each injector pump
  3. Turning off the ignition switch
  4. Enriching the fuel supply to each cylinder
- 5-20. During operation of a Caterpillar fuel injection system, the governor will compensate for all except which of the following fuel rack settings?
1. 1/4 throttle
  2. 1/2 throttle
  3. 3/4 throttle
  4. Full throttle

- 5-21. Before proceeding with the final stage in testing a Caterpillar fuel injector pump, the mechanic must remember to perform which of the following procedures?
1. Siphon fuel from the pump into the collector jar
  2. Bleed air from the pump and collector assembly
  3. Inspect the injector screen filter before attaching the collector assembly
- 5-22. After testing an injector pump, you see that the fuel level in the collector jar is above the good range. What is the condition of the pump?
1. Its plunger and barrel are worn
  2. Its discharge capacity is below normal
  3. Its discharge measurement is not accurate
  4. It is as good as new
- 5-23. On the capsule type of fuel injection valves, the fuel injection test apparatus allows the mechanic to make which of the following checks?
1. Leakage rate
  2. Spray characteristics
  3. Valve opening pressure
  4. All of the above
- 5-24. An injector orifice damaged when carbon deposits are wire brushed from an injector valve could result in which of the following problems?
1. Precombustion
  2. Reduced power output
  3. Excessive fuel output
  4. No valve opening pressure
- 5-25. To be satisfactory, the injector valve opening pressure (as read on the test gauge) should fall between which of the following pressure ranges?
1. 100 to 200 psi
  2. 200 to 300 psi
  3. 300 to 400 psi
  4. 400 to 800 psi
- 5-26. The Caterpillar compact fuel system transfer pump delivers fuel to which of the following components?
1. The injection valve
  2. The filter
  3. The capsule
  4. The manifold
- 5-27. The compact injection pump plungers complete a full stroke at which of the following speeds?
1. Idle only
  2. Fast idle only
  3. Governed speed only
  4. Idle, fast idle, and governed speed
- 5-28. On a compact fuel injection system, what must react on the speed limiter before the governor control may move to high idle?
1. Oil pressure
  2. Fuel pressure
  3. The limiter plunger
  4. The governor linkage
- 5-29. Which of the following faults does NOT cause a smoky exhaust?
1. Lack of air
  2. Lack of fuel
  3. Overloading
  4. Lack of compression
- 5-30. The sleeve position in the Caterpillar sleeve metering fuel system is controlled by what component?
1. The plunger
  2. The barrel
  3. The priming pump
  4. The governor
- 5-31. In a Caterpillar sleeve metering fuel injection system, fuel injection begins at what point?
1. As the fuel inlet closes
  2. As the fuel outlet opens
  3. As the injector housing is charged
  4. As the reverse flow check valve closes

5-32. The reverse flow check valve in the sleeve metering fuel injection pump is closed by what means?

1. Compression pressure
2. Spring pressure
3. Residual pressure
4. Cam action

5-33. After normal start-up, at what rpm does the governor take over in a Caterpillar sleeve metering fuel injector pump?

1. 300
2. 500
3. 750
4. 900

5-34. Most fuel problems may be traced to which of the following causes?

1. Dirty fuel filters only
2. Broken fuel line only
3. Poor quality fuel only
4. Dirty fuel filters, a broken fuel line, and poor quality fuel

5-35. The Caterpillar sleeve metering fuel injection system does not require frequent balancing for which of the following reasons?

1. It is adjusted by fuel pressure
2. It has built-in calibration
3. It is adjusted by normal governor operation
4. Both 2 and 3 above

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IN ANSWERING QUESTIONS 5-36 THROUGH 5-43, SELECT FROM COLUMN B THE PROBLEM THAT IS LIKELY TO BE CAUSED BY THE CONDITION GIVEN IN COLUMN A. RESPONSES IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. CONDITIONS</u>	<u>B. PROBLEMS</u>
5-36.	Hand primer installed backwards	1. Engine idles imperfectly
5-37.	Throttle arm travel not sufficient	2. Engine starts hard
5-38.	Pump housing not full of fuel	3. Fuel not reaching pump
5-39.	One or more connector screws obstructed	4. Fuel reaching nozzles, but engine will not start
5-40.	Tank valve closed	
5-41.	Governor linkage broken	
5-42.	Fuel line leaking or connected to wrong cylinder	
5-43.	Governor spring worn or broken	

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5-44. A Roosamaster fuel injection pump test reading should be taken at (a) what idle, and with (b) what load conditions?

1. (a) Low idle (b) no load
2. (a) High idle (b) no load
3. (a) Low idle (b) high load
4. (a) High idle (b) high load

- 5-45. When you test the transfer pump, which of the following conditions will NOT cause a low-pressure reading on the test gauge?
1. Air leaks on the suction side of the pump
  2. A restricted fuel return line
  3. A malfunctioning regulator valve
  4. Worn transfer pump blades
- 5-46. When you are testing a Roosamaster fuel injection pump, a reading of how many inches of vacuum indicates a restricted fuel supply?
1. 5
  2. 7
  3. 9
  4. 10
- 5-47. Each time a Roosamaster fuel injection pump is overhauled, which of the following parts is/are always replaced?
1. Springs
  2. Seal seats
  3. O rings and seals
  4. Timing plate
- 5-48. The American Bosch fuel injection pump used on the multifuel engine has which of the following features?
1. Sleeve-control
  2. Constant-stroke
  3. Distributing-plunger
  4. All of the above
- 5-49. Fuels used in the multifuel engine pump do not require special qualities.
1. True
  2. False
- 5-50. The American Bosch Model PSB fuel supply pump is what type?
1. Centrifugal
  2. Positive displacement
  3. Diaphragm
- 5-51. The mechanical centrifugal advance unit provides what maximum amount of advance timing?
1. 22 1/2°
  2. 18°
  3. 17 1/2°
  4. 9°
- 5-52. When you are adjusting an American Bosch fuel injector, a reading of how many PSI indicates a need to adjust the opening pressure?
1. 30
  2. 45
  3. 50
  4. 65
- 5-53. Which of the following terms refers to the groove in the top face of the nozzle valve body?
1. Helix
  2. Orifice
  3. annular
- 5-54. Assume you are using the test pump shown in figure 5-27 of your TRAMAN to check the spray valve-opening pressure. The opening pressure specified for the check valve is 200 psi. Which of the following readings of the spray valve opening indicates a bad check valve or seat?
1. 195 psi
  2. 180 psi
  3. 160 psi
  4. 140 psi
- 5-55. Before you install a nozzle in the engine, you should retest it for which of the following defects?
1. Leakage
  2. Spray angle and pattern
  3. Valve-opening pressure
  4. Each of the above

5-56. While troubleshooting the General Motors fuel system, you discover that the fuel pump is not functioning satisfactorily. Before removing the fuel pump, you should make sure of which of the following conditions?

1. There is fuel in the tank
2. The filter cover bolt is tight
3. The fuel supply valve is open
4. Each of the above

5-57. In a General Motors fuel injection system, which of the following is the most common failure of the fuel transfer pump?

1. Leaking seals
2. Worn gears
3. Sticking relief valve
4. Worn bore seat

5-58. An engine lacks power, runs unevenly, or stalls at idle even after its fuel pump is reconditioned. Which of the following faults should you suspect?

1. Restricted fuel flow
2. Faulty injector
3. Excessive vacuum pressure
4. Dirty fuel filter

5-59. If a General Motors injector passes all but one of its pressure tests, the mechanic should allow it to remain in service.

1. True
2. False

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IN ANSWERING QUESTIONS 5-60 THROUGH 5-63, SELECT FROM COLUMN B THE INJECTOR TEST THAT CORRESPONDS WITH THE PURPOSE IN COLUMN A. RESPONSES IN COLUMN B MAY BE USED MORE THAN ONCE.

	<u>A. PURPOSES</u>	<u>B. INJECTOR TESTS</u>
5-60.	To measure the pressure at which the valve opens and injection begins	1. Valve-opening pressure test
5-61.	To determine whether fuel leaks at the injector filter cap gaskets, body plugs, and nut seal ring	2. Valve-holding pressure 3. High-pressure test
5-62.	To determine whether the injector plunger and bushing clearance is satisfactory	
5-63.	To determine whether lapped surfaces in the injector are sealing properly	

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5-64. Which of the following valve-opening pressure readings is within the specified limits for the needle valve injector?

1. 450 psi
2. 800 psi
3. 3,000 psi
4. 4,000 psi

- 5-65. During the valve-holding pressure test of an injector, the opening pressure drops from 450 psi to 250 psi in 50 seconds. What does the drop rate indicate?
1. A leak due to poor bushing-to-body fit
  2. A leaking valve assembly due to a damaged surface or dirt
  3. A loose filter cap gasket
  4. An injector whose lapped surfaces are sealing properly
- 5-66. In a General Motors diesel unit type fuel injector, what action should you take if a high-pressure test shows excessive clearance between the plunger and bushing?
1. Replace the plunger
  2. Replace the bushing
  3. Replace the bushing and plunger as a set
  4. Resurface the plunger and reuse the bushing
- 5-67. The plunger bottom helix and the lower portion of the upper helix should be visually checked during which of the following tests?
1. Spray pattern test
  2. Injector control rack and plunger movement test
  3. High-pressure test
  4. Fuel output test
- 5-68. To determine whether the fuel output of a General Motors injector falls within the manufacturer's recommended limits, the mechanic should use which of the following devices?
1. A fuel pump and fuel collector assembly
  2. A General Motors injector tester
  3. A comparator
- 5-69. The General Motors injector spray tip is normally soaked in solvent for approximately 15 minutes for which of the following reasons?
1. To loosen the dirt on the outside of the tip for easy cleaning
  2. To loosen the carbon on the inside of the tip before reaming
  3. To loosen the carbon on both the outside and inside of the tip before disassembly
- 5-70. When working with General Motors unit type of injectors, which, if any, of the following actions must you take before reusing any parts?
1. Lap all sealing surfaces of the internal parts
  2. Lap the injector bushing only
  3. Lap the check valve and spray tip
  4. None of the above
- 5-71. You can eliminate a PT fuel injection system fuel pump as a potential source of trouble by taking which of the following actions?
1. Checking for internal leakage
  2. Checking for external leakage
  3. Checking the fuel manifold pressure
  4. Each of the above
- 5-72. On a PT type of fuel injection system, when should maximum fuel manifold pressure be obtained?
1. At idle
  2. Just off idle
  3. After the governor cuts in
  4. Just before the governor cuts in
- 5-73. To remove carbon from PT fuel injector tips, you should use which of the following methods?
1. A wire brush
  2. Reverse flushing
  3. A pin vise and the proper size fine wire

5-74. The aneroid controls the exhaust emissions by creating a lag in the fuel system equal to that of the turbo charge.

1. True
2. False

5-75. The body of a PT fuel pump is manufactured of what metal?

1. Plastic
2. Iron
3. Aluminum
4. Bronze